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PB-258 283

Harlan County Reservoir Harlan County, Nebraska

Pacific Northwest Environmental Research Lab, Corvallis, Oreg

Prepared for

Nebraska State Dept of Environmental Control, Lincoln

Aug 76

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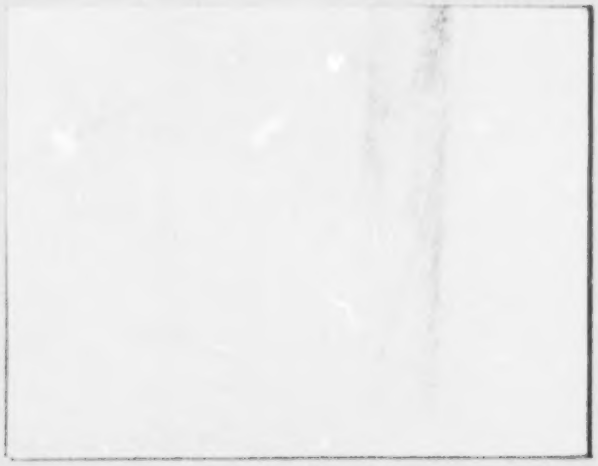
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES



CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

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REPORT

ON

HARLAN COUNTY RESERVOIR

HARLAN COUNTY

NEBRASKA

EPA REGION VII

WORKING PAPER No. 555

WITH THE COOPERATION OF THE

NEBRASKA DEPARTMENT OF ENVIRONMENTAL CONTROL

AND THE

NEBRASKA NATIONAL GUARD

AUGUST, 1976

TECHNICAL REPORT DATA *(Please read Instructions on the reverse before completing)*		
1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Report on Harlan County Reservoir, Harlan County, Nebraska		5. REPORT DATE Prepared August 1976 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 555
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460		13. TYPE OF REPORT AND PERIOD COVERED Final - 1974 14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114		

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

PRICES SUBJECT TO CHANGE

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release unlimited		50
	20. SECURITY CLASS *(This page)*	22. PRICE
		$4.00

EPA Form 2220-1 (9-73)

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Nebraska Department of Environmental Control for professional involvement, to the Nebraska National Guard for conducting the tributary sampling phase of the Survey, and to those wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

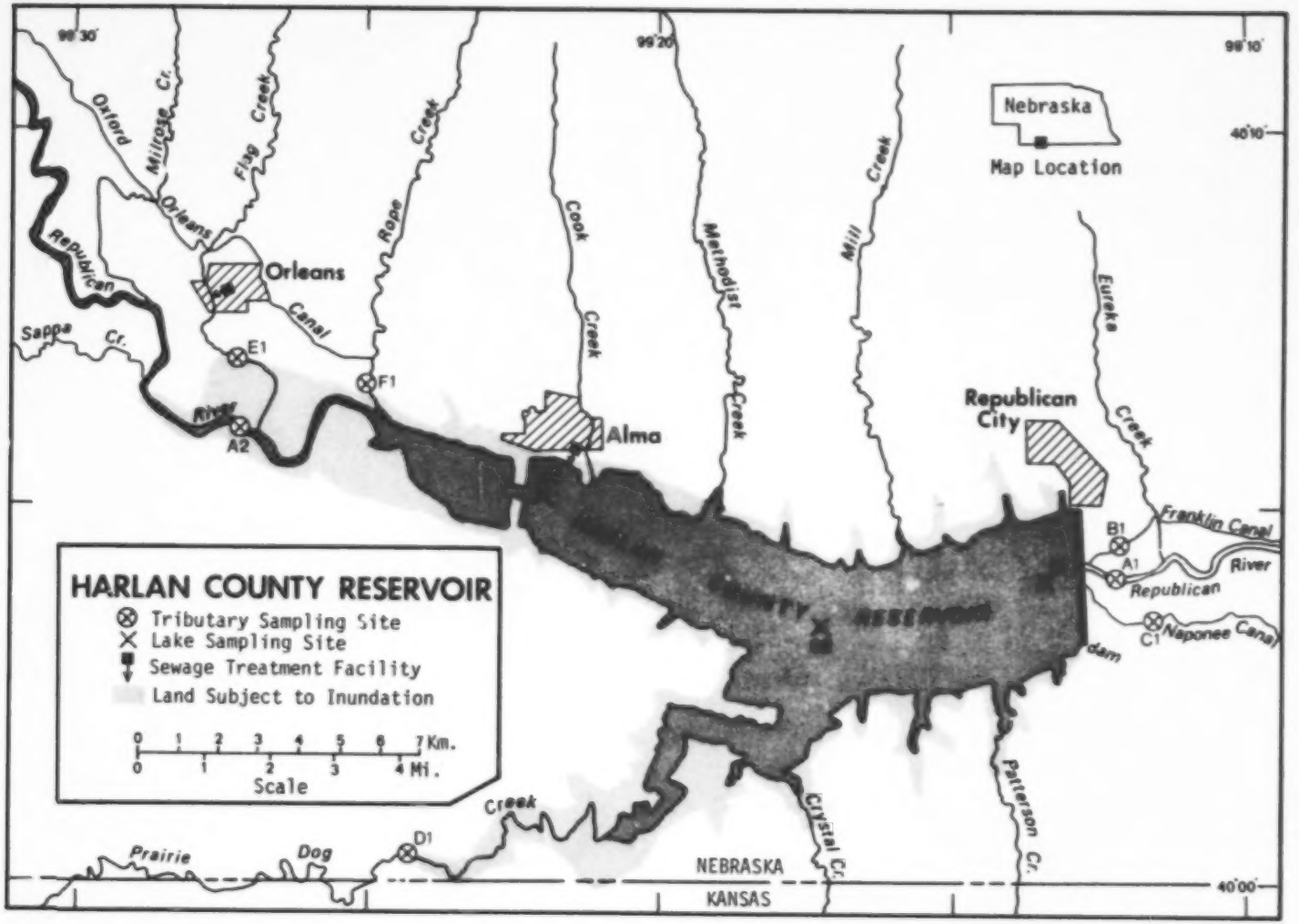
The staff of the Water Pollution Control Division, Department of Environmental Control, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

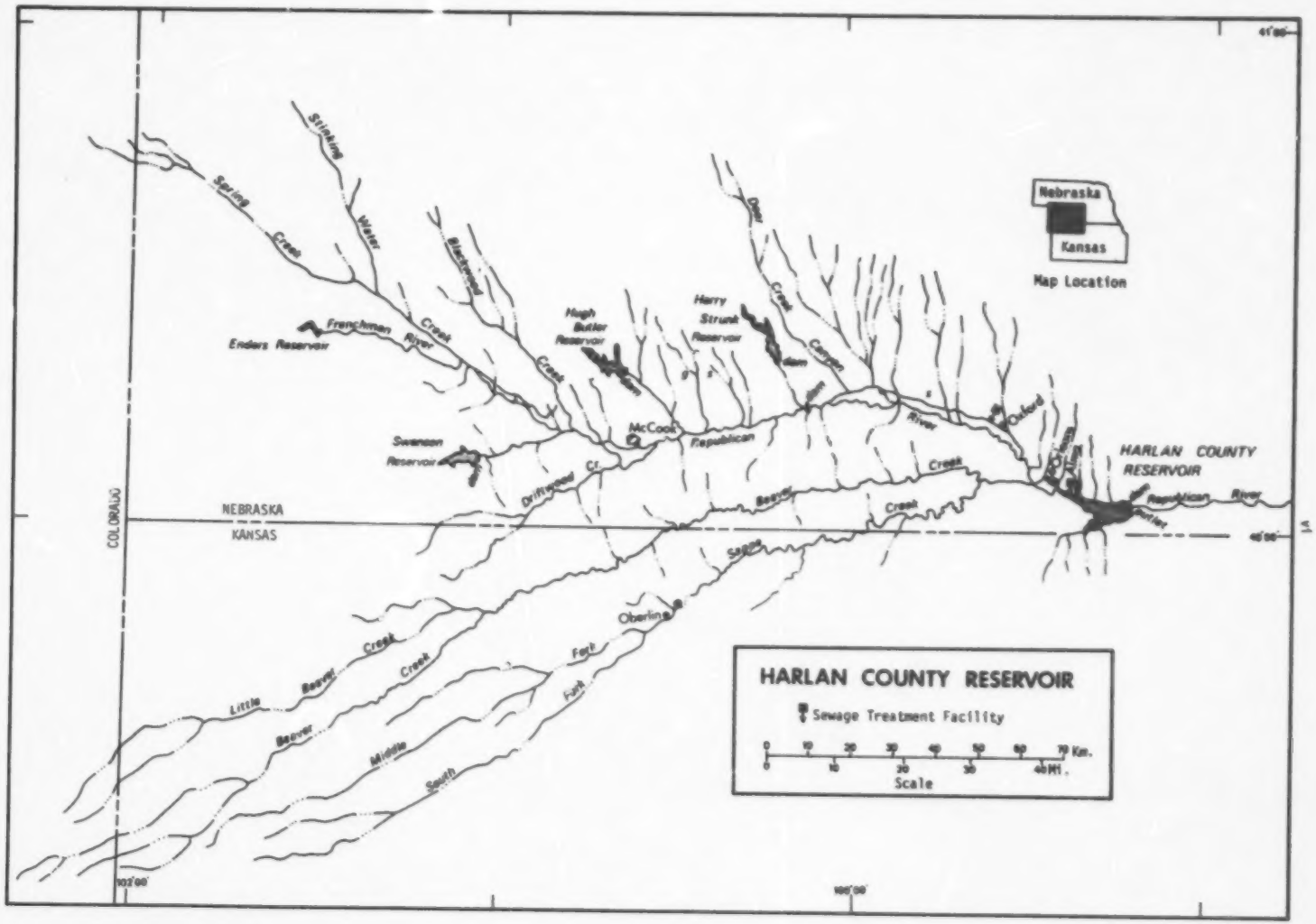
Major General Francis L. Winner, the Adjutant General of Nebraska, and Project Officer Colonel Burl M. Johnson, who directed the volunteer efforts of the Nebraska National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STATE OF NEBRASKA

RESERVOIR NAME	COUNTY
Branched Oak	Lancaster
Harlan County	Harlan
Harry D. Strunk	Frontier
Hugh Butler	Frontier, Red Willow
Johnson	Dawson, Gosper
McConaughy	Keith
Pawnee	Lancaster
Sherman	Sherman
Swanson	Hitchcock


99°30'
99°20'
99°10'
40°10'
40°00'
Nebraska
Map Location
Oxford
Millrose Cr.
Flag Creek
Rose Creek
Cook Creek
Methodist Creek
Mill Creek
Eureka Creek
Republican
Orleans
Orleans Canal
Sappa Cr.
E1
F1
A2
Alma
Republican City
B1
A1
Franklin Canal
Republican River
C1
Naponee Canal
dam
HARLAN COUNTY RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Land Subject to Inundation
0 1 2 3 4 5 6 7 Km.
0 1 2 3 4 Mi.
Scale
Prairie Dog Creek
D1
Crystal Cr.
Patterson Cr.
NEBRASKA
KANSAS


Nebraska
Kansas
Map Location
HARLAN COUNTY RESERVOIR
Sewage Treatment Facility
Scale
NEBRASKA
KANSAS
COLORADO
Enders Reservoir
Swanson Reservoir
Hugh Butler Reservoir
Harry Strunk Reservoir
McCook
Oberlin
Republican River
Frenchman Creek
Driftwood Cr.
Beaver Creek
Little Beaver
Middle
South Fork
Sappa
Deer Creek
Medicine Creek
Turkey Creek
Indian Creek
Oxford
Orleans
Franklin
Naponee
Alma
Republican River

HARLAN COUNTY RESERVOIR

STORET NO. 3102

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Harlan County Reservoir is hypereutrophic. It ranked last in overall trophic quality when the nine Nebraska reservoirs sampled in 1974 were compared using a combination of six parameters*. All of the other reservoirs had less median total and dissolved phosphorus, six had less median inorganic nitrogen, all of the others had less mean chlorophyll a, and seven had greater mean Secchi disc transparency. Depression of dissolved oxygen with depth occurred at sampling station 1 in June.

Survey limnologists did not observe macrophytes or surface concentrations of algae during sampling visits.

B. Rate-Limiting Nutrient:

Because of nutrient losses in the samples, the algal assay results are not considered indicative of conditions in the reservoir at the times the samples were taken (04/16/74 and 09/30/74). The reservoir data indicate nitrogen limitation at all sampling stations and times except for station 3 in September.

C. Nutrient Controllability:

1. Point sources--During the sampling year, the phosphorus

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* See Appendix A.

contributions of municipal point sources amounted to only 2.6% of the total phosphorus load. The Alma wastewater treatment plant contributed 1.5%, the Oxford wastewater treatment plant contributed 1.1%, and the Orleans wastewater treatment plant contributed 0.1% of the total phosphorus load.

The present loading of 2.22 $g/m^2/yr$ is almost five times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 14).

In view of the small point-source phosphorus inputs and the nitrogen-limited condition of the reservoir, it does not seem likely that point-source phosphorus control would result in any appreciable improvement in the trophic condition of Harlan County Reservoir unless non-point inputs also can be controlled (see below).

2. Non-point sources--The phosphorus contributions of non-point sources accounted for 97.3% of the total phosphorus load during the sampling year. The Republican River contributed 81.3%, Prairie Dog Creek contributed 11.5%, and Rope Creek contributed 0.5% of this load. Ungaged tributaries were estimated to have contributed 3.1%.

Although the nutrient export rates of the gaged tributaries were quite low during the sampling year (see page 13), Harlan County Reservoir has a relatively long hydraulic retention

time, and the drainage basin is large and is composed mainly of farmland and pasture (Sheets, 1975). Any significant reduction in the phosphorus load to the reservoir would require changes in land-use practices in the watershed.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 54.50 kilometers^2.
2. Mean depth: 7.8 meters.
3. Maximum depth: 21.6 meters.
4. Volume: 425.100 x 10^6 m^3.
5. Mean hydraulic retention time: 1.4 years (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Republican River	31,572.1	10.65
Prairie Dog Creek	2,745.4	0.50
Rope Creek	69.9	0.03
Minor tributaries & immediate drainage -	600.8	0.19
Totals	34,988.2	11.37

2. Outlets -

Republican River	35,042.7	8.93
Franklin Canal**	0.0	0.90
Naponee Canal**	0.0	0.10
Total	35,042.7***	9.93

C. Precipitation****:

1. Year of sampling: 60.9 centimeters.
2. Mean annual: 63.4 centimeters.

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† Table of metric conversions--Appendix B.
†† Hartung, 1974; Adamovich, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Alridge, 1976.
*** Includes area of reservoir.
**** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Harlan County Reservoir was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one or more depths at three stations on the reservoir (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first and third visits, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 15.2 meters at station 1, 10.7 meters at station 2, and 1.2 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR HARLAN COUNTY RESERVOIR
STORET CODE 3102

PARAMETER	1ST SAMPLING (4/16/74) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (6/28/74) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/30/74) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	8.1 - 10.2	9.2	9.4	18.8 - 23.0	21.6	22.1	15.8 - 16.5	16.2	16.4
DISS OXY (MG/L)	9.8 - 12.0	10.6	10.6	2.8 - 9.2	7.1	7.7	8.2 - 9.4	8.6	8.4
CNDCTVY (MCROMO)	186. - 442.	320.	317.	544. - 563.	557.	559.	463. - 513.	483.	475.
PH (STAND UNITS)	8.3 - 8.4	8.4	8.4	7.9 - 8.7	8.4	8.5	8.1 - 8.5	8.3	8.3
TOT ALK (MG/L)	196. - 230.	204.	199.	197. - 222.	206.	202.	193. - 196.	195.	195.
TOT P (MG/L)	0.096 - 0.185	0.130	0.127	0.099 - 0.290	0.149	0.122	0.028 - 0.246	0.095	0.080
ORTHO P (MG/L)	0.019 - 0.085	0.060	0.060	0.077 - 0.132	0.102	0.096	0.003 - 0.032	0.025	0.027
NO2+NO3 (MG/L)	0.080 - 0.550	0.335	0.310	0.060 - 0.590	0.292	0.270	0.060 - 0.240	0.197	0.200
AMMONIA (MG/L)	0.040 - 0.140	0.105	0.130	0.030 - 0.140	0.073	0.065	0.030 - 0.060	0.046	0.040
KJEL N (MG/L)	0.600 - 1.400	1.109	1.100	0.600 - 1.300	0.833	0.750	0.200 - 0.600	0.433	0.500
INORG N (MG/L)	0.130 - 0.590	0.440	0.440	0.120 - 0.640	0.365	0.365	0.090 - 0.380	0.242	0.250
TOTAL N (MG/L)	1.150 - 1.710	1.444	1.450	0.890 - 1.590	1.125	1.065	0.260 - 0.820	0.630	0.700
CHLRPYL A (UG/L)	14.9 - 30.2	21.0	17.9	4.2 - 101.8	42.7	22.1	12.0 - 25.7	19.8	21.6
SECCHI (METERS)	0.3 - 0.5	0.3	0.3	0.3 - 1.5	1.0	1.2	0.3 - 0.6	0.5	0.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/16/74	1. Cyclotella sp.	17,479
	2. Asterionella sp.	4,211
	3. Flagellates	2,105
	4. Dactylococcopsis sp.	979
	5. Stephanodiscus sp.	832
	Other genera	784
	Total	26,390
06/28/74	1. Melosira sp.	1,759
	2. Carteria sp.	879
	3. Aphanizomenon sp.	837
	4. Stephanodiscus sp.	502
	5. Fragilaria sp.	419
	Other genera	1,299
	Total	5,695
09/30/74	1. Stephanodiscus sp.	3,555
	2. Cyclotella sp.	1,616
	3. Flagellates	1,050
	4. Dactylococcopsis sp.	162
	5. Scenedesmus sp.	162
	Other genera	618
	Total	7,163

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/16/74	1	17.9
	2	14.9
	3	30.2
06/28/74	1	22.1
	2	4.2
	3	101.8
09/30/74	1	21.6
	2	25.7
	3	12.0

C. Limiting Nutrient Study:

The algal assay results are not considered indicative of conditions in the lake due to significant changes in nutrients in the samples during shipment from the field to the laboratory.

The reservoir data indicate nitrogen limitation at all three sampling stations in April and June and at stations 1 and 2 in September (the mean inorganic nitrogen/orthophosphorus ratios were 10/1 or less). However, station 3 was phosphorus limited in September (the N/P ratio was 30/1).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Nebraska National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the maps (pages v and vi), except for the high runoff months of May and June when two samples were collected. Sampling was begun in August, 1974, and was completed in August, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Nebraska District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for the Republican River outlet, Franklin Canal, and Naponee Canal were calculated using the means of the concentrations measured at A-1, B-1, and C-1 and the combined outflow. Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the mean concentrations in Rope Creek at station F-1 and mean ZZ flow.

The operators of the Orleans and Alma wastewater treatment plants provided monthly effluent samples and corresponding flow data. The town of Oxford provided only four effluent samples and corresponding flow data; nutrient loads from this source were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m^3/capita/day.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Oxford	1,116	act. sludge	422.4	Republican River
Orleans	648	stab. pond	64.8	Flag Creek/ Republican River
Alma	1,280	tr. filter	587.4	Harlan Co. Reservoir
Stamford	220	stab. pond	-	no discharge*

2. Known industrial - None

† Treatment plant questionnaires.
* Hartung, 1974.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Republican River	98,485	81.3
Prairie Dog Creek	14,065	11.6
Rope Creek	600	0.5
b. Minor tributaries & immediate drainage (non-point load) -	3,785	3.1
c. Known municipal STP's -		
Oxford	1,265	1.1
Orleans	160	0.1
Alma	1,765	1.5
d. Septic tanks* -	45	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	955	0.8
Total	121,125	100.0

2. Outputs -

Lake outlets - Republican River, Franklin Canal, Naponee Canal } 24,740

3. Net annual P accumulation - 96,385 kg.

* Estimate based on 38 seasonal and 66 permanent shoreline dwellings and one campground; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Republican River	914,105	87.5
Prairie Dog Creek	43,235	4.1
Rope Creek	2,415	0.2
b. Minor tributaries & immediate drainage (non-point load) -	15,310	1.5
c. Known municipal STP's -		
Oxford	3,795	0.4
Orleans	555	<0.1
Alma	5,040	0.5
d. Septic tanks* -	1,600	0.2
e. Known industrial - None	-	-
f. Direct precipitation** -	58,840	5.6
Total	1,044,895	100.0

2. Outputs -

Lake outlets - Republican River, Franklin Canal, Naponee Canal } 349,165

3. Net annual N accumulation - 695,730 kg.

* Estimate based on 38 seasonal and 66 permanent shoreline dwellings and one campground; see Working Paper No. 175.
** See Working Paper No. 175.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Republican River	3	29
Prairie Dog Creek	5	16
Rope Creek	9	35

E. Mean Nutrient Concentrations in Ungaged Stream:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Flag Creek	0.516	2.501

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	2.22	1.77	19.2	12.8

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Harlan County Reservoir:

"Dangerous" (eutrophic loading)	0.46
"Permissible" (oligotrophic loading)	0.23

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
3101	BRANCHED OAK	0.044	0.070	456.444	17.033	9.400	0.013
3102	HARLAN COUNTY RESERVOIR	0.112	0.365	476.111	27.822	12.200	0.061
3103	HARRY D. STRUNK (MEDICIN	0.064	0.460	470.500	14.367	14.200	0.009
3104	HUGH BUTLER (RED WILLOW)	0.061	0.090	468.875	16.612	14.400	0.014
3105	JOHNSON RESERVOIR	0.075	0.340	477.667	26.133	8.600	0.009
3106	LAKE MCCONAUGHY	0.027	0.585	409.555	8.644	11.400	0.004
3107	PAWNEE LAKE	0.060	0.175	453.000	15.367	8.800	0.020
3108	SHERMAN COUNTY RESERVOIR	0.067	0.090	451.167	6.717	11.800	0.050
3110	SWANSON RESERVOIR	0.067	0.090	466.333	14.450	11.000	0.016

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3101	BRANCHED OAK	88 (7)	100 (8)	63 (5)	25 (2)	75 (6)	63 (5)	414
3102	HARLAN COUNTY RESERVOIR	0 (0)	25 (2)	13 (1)	0 (0)	25 (2)	0 (0)	63
3103	HARRY D. STRUNK (MEDICIN	50 (4)	13 (1)	25 (2)	75 (6)	13 (1)	81 (6)	257
3104	HUGH BUTLER (RED WILLOW)	63 (5)	75 (5)	38 (3)	38 (3)	0 (0)	50 (4)	264
3105	JOHNSON RESERVOIR	13 (1)	38 (3)	0 (0)	13 (1)	100 (8)	81 (6)	245
3106	LAKE MCCONAUGHY	100 (8)	0 (0)	100 (8)	88 (7)	50 (4)	100 (8)	438
3107	PAWNEE LAKE	75 (6)	50 (4)	75 (6)	50 (4)	88 (7)	25 (2)	363
3108	SHERMAN COUNTY RESERVOIR	38 (3)	75 (5)	88 (7)	100 (8)	38 (3)	13 (1)	352
3110	SWANSON RESERVOIR	25 (2)	75 (5)	50 (4)	63 (5)	63 (5)	38 (3)	314

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3106	LAKE MCCONAUGHY	438
2	3101	BRANCHED OAK	414
3	3107	PAWNEE LAKE	363
4	3108	SHERMAN COUNTY RESERVOIR	352
5	3110	SWANSON RESERVOIR	314
6	3104	HUGH BUTLER (RED WILLOW)	264
7	3103	HARRY D. STRUNK (MEDICIN	257
8	3105	JOHNSON RESERVOIR	245
9	3102	HARLAN COUNTY RESERVOIR	63

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NEBRASKA 12/23/75

LAKE CODE 3102 HARLAN COUNTY RES.

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 35042.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3102A1	35042.7	2.63	5.38	5.95	10.19	9.94	15.26	27.58	14.33	4.84	5.24	2.92	2.52	8.93
3102A2	31572.1	5.61	10.05	11.67	10.42	11.98	23.81	15.97	10.19	7.76	8.13	6.65	5.69	10.65
3102D1	2745.4	0.12	0.39	0.25	0.17	0.23	1.81	0.77	0.65	0.71	0.62	0.14	0.12	0.50
3102F1	69.9	0.01	0.02	0.04	0.03	0.06	0.03	0.04	0.02	0.03	0.01	0.02	0.02	0.03
3102ZZ	655.3	0.08	0.15	0.20	0.17	0.29	0.36	0.26	0.17	0.22	0.13	0.10	0.09	0.19

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 35042.7
SUM OF SUB-DRAINAGE AREAS = 35042.7
TOTAL FLOW IN = 136.48
TOTAL FLOW OUT = 106.78

NOTE *** TOTAL & ZZ DR. AREAS DIRECTLY CONTRIBUTING. 20750 SQ. MI. TOTAL AREA.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3102A1	8	74	9.71	24	3.96				
	9	74	0.32	8	0.31				
	10	74	0.41	5	0.48				
	11	74	0.35	17	0.31				
	12	74	0.31	8	0.28				
	1	75	0.33	5	0.34				
	2	75	0.31	9	0.31				
	3	75	0.28	23	0.23				
	4	75	0.25	20	0.22				
	5	75	0.73	17	0.25	30	0.40		
	6	75	4.56	7	0.34	21	0.31		
	7	75	26.28	17	26.25				
	8	75	14.16	24	7.36				
3102A2	8	74	3.43	24	2.81				
	9	74	2.19	8	2.69				
	10	74	2.92	5	1.90				
	11	74	4.82	17	3.82				
	12	74	3.74	8	4.11				
	1	75	4.79	5	3.68				
	2	75	4.67	9	2.12				
	3	75	6.91	23	6.48				
	4	75	5.87	20	4.84				
	5	75	3.17	17	2.75	30	4.73		
	6	75	33.13	7	1.16	21	137.22		
	7	75	7.87	17	4.84				
	8	75	7.76	24	2.72				

TRIBUTARY FLOW INFORMATION FOR NEBRASKA 12/23/75

LAKE CODE 3102 HARLAN COUNTY RES.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
310201	8	74	0.0	24	0.0				
	9	74	0.0	8	0.0				
	10	74	0.0	5	0.0				
	11	74	0.03	17	0.0				
	12	74	0.02	8	0.0				
	1	75	0.14	5	0.0				
	2	75	0.28	9	0.01				
	3	75	0.28	23	0.28				
	4	75	0.11	20	0.14				
	5	75	0.03	17	0.08	30	0.14		
	6	75	0.42	7	0.03	21	0.37		
	7	75	0.17	17	0.0				
	8	75	0.0	24	0.0				
3102F1	8	74	0.00	24	0.00				
	9	74	0.00	8	0.00				
	10	74	0.01	5	0.0				
	11	74	0.02	17	0.02				
	12	74	0.03	8	0.02				
	1	75	0.02	5	0.02				
	2	75	0.02	9	0.03				
	3	75	0.03	23	0.03				
	4	75	0.03	20	0.03				
	5	75	0.11	17	0.03	30	0.03		
	6	75	0.31	7	0.01	21	0.99		
	7	75	0.06	17	0.04				
	8	75	0.01	24	0.0				
3102ZZ	8	74	0.01	24	0.01				
	9	74	0.01	8	0.01				
	10	74	0.05	5	0.0				
	11	74	0.08	17	0.10				
	12	74	0.15	8	0.10				
	1	75	0.11	5	0.09				
	2	75	0.13	9	0.12				
	3	75	0.15	23	0.16				
	4	75	0.16	20	0.15				
	5	75	0.53	17	0.16	30	0.15		
	6	75	1.51	7	0.03	21	4.67		
	7	75	0.31	17	0.20				
	8	75	0.05	24	0.0				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/12/23

310201
40 03 27.0 099 12 36.0
HARLAN COUNTY RESERVOIR
3108J NEBRASKA

11EPALES
3

2111202
0056 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/04/16	16 00	0000	9.6		19	186	8.40	199	0.130	1.400	0.310	0.059
	16 00	0005	9.5	10.6		245	8.40	198	0.120	1.100	0.300	0.058
	16 00	0015	9.4	12.0		302	8.35	196	0.120	1.200	0.310	0.056
	16 00	0025	8.3	10.2		321	8.35	196	0.130	1.200	0.320	0.057
	16 00	0050	8.1	9.8		370	8.40	230	0.050	1.100	0.080	0.019
74/06/28	14 45	0000	22.5	9.2	60	563	8.60	218	0.050	1.000	0.240	0.081
	14 45	0005	22.5	9.2		562	8.70	200	0.040	0.700	0.190	0.096
	14 45	0015	22.4	9.0		560	8.50	199	0.030	0.800	0.200	0.077
	14 45	0035	19.4	4.0		544	8.10	202	0.040	0.600	0.480	0.108
	14 45	0050	18.8	2.8		557	7.90	216	0.050	1.000	0.590	0.111
74/09/30	11 54	0000	16.4	8.4	24	471	8.50	195	0.040	0.600	0.220	0.028
	11 54	0005	16.4	8.2		475	8.30	193	0.050	0.500	0.220	0.028
	11 54	0015	16.4	8.2		471	8.40	194	0.060	0.500	0.230	0.032
	11 54	0045	16.4	8.2		482	8.30	195	0.060	0.500	0.240	0.032

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/04/16	16 00	0000	0.133	17.9	
	16 00	0005	0.128		
	16 00	0015	0.105		
	16 00	0025	0.109		
	16 00	0050	0.096		
74/06/28	14 45	0000	0.104	22.1	
	14 45	0005	0.140		
	14 45	0012			1.0
	14 45	0015	0.116		
	14 45	0035	0.136		
	14 45	0050	0.128		
74/09/30	11 54	0000	0.075	21.6	
	11 54	0004			1.0
	11 54	0005	0.079		
	11 54	0015	0.080		
	11 54	0045	0.093		

STORET RETRIEVAL DATE 75/12/23

310202
40 03 45.0 099 17 42.0
HARLAN COUNTY RESERVOIR
31083 NEBRASKA

11EPALES
3

2111202
0040 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/04/16	16	25 0000	9.3		12	191	8.40	197	0.130	1.300	0.310	0.060
	16	25 0005	9.3	10.8		233	8.40	198	0.130	1.100	0.310	0.062
	16	25 0015	8.3	10.0		312	8.30	201	0.130	1.200	0.310	0.061
	16	25 0035	8.2	10.2		351	8.30	203	0.140	1.100	0.330	0.062
74/06/28	14	25 0000	22.1	7.7	48	559	8.40	200	0.090	0.800	0.250	0.088
	14	25 0005	22.1	7.2		558	8.50	204	0.100	0.700	0.290	0.097
	14	25 0015	22.0	7.2		555	8.50	198	0.140	0.700	0.340	0.095
	14	25 0025	21.8	7.8		554	8.50	197	0.100	0.700	0.300	0.081
	14	25 0035	20.2	4.6		548	8.10	222	0.110	0.700	0.460	0.132
74/09/30	12	20 0000	16.0	8.8	18	497	8.20	195	0.040	0.500	0.200	0.026
	12	20 0005	15.9	8.8		463	8.10	195	0.040	0.400	0.200	0.024
	12	20 0015	15.8	8.8		501	8.10	195	0.040	0.400	0.200	0.025
	12	20 0030	15.8	8.4		513	8.10	193	0.050	0.300	0.200	0.027

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/04/16	16	25 0000	0.134	14.9	
	16	25 0005	0.125		
	16	25 0015	0.127		
	16	25 0035	0.115		
74/06/28	14	25 0000	0.109	4.2	
	14	25 0005	0.099		
	14	25 0012			1.0
	14	25 0015	0.102		
	14	25 0025	0.099		
	14	25 0035	0.190		
74/09/30	12	20 0000	0.079	25.7	
	12	20 0003			1.0
	12	20 0005	0.088		
	12	20 0015	0.090		
	12	20 0030	0.246		

STORET RETRIEVAL DATE 75/12/23

310203
40 05 10.0 099 22 03.0
HARLAN COUNTY RESERVOIR
31047 NEBRASKA

11EPALES
3

2111202
0007 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/04/16	16	15 0000	10.2		10	442	8.45	200	0.040	0.900	0.550	0.077
	16	15 0002	10.2	11.0		442						
	16	15 0004	10.1	11.0		441	8.45	230	0.040	0.600	0.550	0.085
74/06/28	14	00 0000	23.0	8.0	12	561	8.70	202	0.060	1.300	0.060	0.132
	14	00 0004	23.0	8.2		561	8.40	210	0.070	1.000	0.100	0.127
74/09/30	15	10 0000	16.5	9.4	12	470	8.40	196	0.030	0.200K	0.060	0.003

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/04/16	16	15 0000	0.175	30.2	
	16	15 0004	0.185		
74/06/28	14	00 0000	0.276	101.8	
	14	00 0002			1.0
	14	00 0004	0.290		
74/09/30	15	10 0000	0.028	12.0	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/01/27

3102A1
40 04 00.0 099 12 15.0
REPUBLICAN RIVER
31 HARLAN CO HWY MP
O/HARLAN COUNTY RES
BANK SAMPLE BELO HARLAN CO DAM SPILLWAY
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	11 55		0.250	0.600	0.030	0.050	0.090
74/09/08	09 34		0.216	0.500	0.025	0.025	0.075
74/10/05	11 28		0.168	0.600	0.030	0.025	0.060
74/11/17	10 10		0.208	0.400	0.025	0.025	0.025
74/12/08	10 20		0.312	0.900	0.055	0.030	0.050
75/02/09	10 00		0.970	0.600	0.032	0.084	0.100
75/03/23	09 50		0.193	2.000	0.104	0.018	0.060
75/04/20	12 30		0.050	1.200	0.030	0.015	0.080
75/05/17	10 45		0.005	0.750	0.105	0.015	0.030
75/05/30	14 30		0.090	1.150	0.067	0.030	0.060
75/06/07	15 08		0.015	0.750	0.030	0.010	0.030
75/06/21	13 30		0.480	0.700	0.135	0.055	0.060
75/07/17	14 00		0.035	1.350	0.045	0.060	0.120
75/08/24	13 30		0.410	0.750	0.030	0.090	0.140

STORET RETRIEVAL DATE 76/01/27

3102A2
40 07 53.0 099 30 08.0
REPUBLICAN RIVER
31 HARLAN CO HWY MP
T/HARLAN COUNTY RES
NE HWY 89 BRDG 2 MI S OF ORLEANS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	10	10	0.004	1.600	0.020	0.060	0.390
74/09/08	09	10	0.460	1.700	0.005		0.340
74/10/05	09	45	0.690	0.700	0.025	0.130	0.180
74/11/17	10	15	1.680	0.600	0.050	0.185	0.210
74/12/08	09	50	2.160	0.700	0.125	0.190	0.240
75/01/05	09	20	2.320	1.200	0.200	0.230	0.255
75/02/09	10	45	2.360	1.800	0.264	0.212	0.230
75/03/23	11	05	1.335	1.950	0.017	0.220	0.310
75/04/20	10	45	0.490	1.650	0.025	0.080	0.200
75/05/17	13	25	0.005	0.850	0.060	0.060	0.190
75/05/30	16	00	0.490	2.700	0.040	0.165	0.520
75/06/07	16	45	0.005	1.350	0.020	0.180	0.340
75/06/21	14	35	0.660	8.100	0.130	0.378	
75/07/17	15	30	0.015	1.950	0.090	0.115	0.350
75/09/24	11	30	0.020	1.450	0.025	0.140	0.400

STORET RETRIEVAL DATE 76/01/27

310281
40 04 30.0 099 12 15.0
FRANKLIN CANAL
31 HARLAN CO HWY MP
0/HARLAN COUNTY RES
AT FOOT BRDG DOWNSTRM FROM N END OF DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	12 14		0.232	0.500	0.015	0.035	0.055
75/07/17	13 30		0.025	1.250	0.035	0.060	0.130
75/08/24	10 00		0.175	0.800	0.025	0.055	0.120

STORET RETRIEVAL DATE 76/01/27

3102C1
40 02 20.0 099 12 50.0
NAPONEE CANAL
31 HARLAN CO HWY MP
O/HARLAN COUNTY RES
FOOT BRDG 1.0 MI E OF DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	12 48		0.252	0.900	0.030	0.050	0.060
75/07/17	14 30		0.040	1.400	0.025	0.060	0.110
75/08/24	11 30		0.220	0.850	0.025	0.060	0.120

STORET RETRIEVAL DATE 76/01/27

310201
40 00 25.0 099 24 20.0
PRAIRIE DOG CREEK
31 HARLAN CO MAP
T/HARLAN COUNTY RES
2NDARY RD BRDG 7.5 MI SW OF ALMA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/03/23	10 30		0.595	1.480	0.033	0.500	0.540
75/04/20	11 30		0.005	1.300	0.100	0.315	0.350
75/05/17	11 40		0.005	0.900	0.045	0.400	0.420
75/05/30	15 00		1.400	2.300	0.110	0.320	0.880
75/06/07	15 55		0.095	1.250	0.040	0.360	0.460
75/06/21	13 40		0.870	6.250	0.175	0.340	2.700

STORET RETRIEVAL DATE 76/01/27

3102E1
40 07 00.0 099 27 15.0
FLAG CREEK
31 HARLAN CO HWY MP
T/HARLAN COUNTY RES
NE HWY 89 BRDG 1 MI S OF ORLEANS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	09 50		0.116	1.400	0.015	0.055	0.290
74/09/08	09 00		0.216	1.400	0.040	0.060	0.290
74/11/17	10 00		0.800	1.600	0.560	0.440	0.460
75/03/23	11 30		0.620	2.100	0.073	0.258	0.340
75/04/20	10 40		0.160	1.600	0.270	0.250	0.370
75/05/17	13 10		0.280	1.080	0.260	0.350	0.375
75/05/30	15 45		1.000	2.900	0.400	0.575	0.820
75/06/07	16 25		1.200	2.500	0.570	0.670	0.880
75/06/21	14 15		0.670	2.700	0.160	0.315	0.890
75/07/17	15 30		1.300	1.900	0.075	0.240	0.520
75/08/24	11 20		0.315	1.650	0.110	0.155	0.440

STORET RETRIEVAL DATE 76/01/27

3102F1
40 06 35.0 099 25 05.0
ROPE CREEK
31 HARLAN CO HWY MP
T/HARLAN COUNTY RES
SEC RD BRDG 2.5 MI S OF ORLEANS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/08/24	10 40		0.300	0.900	0.085	0.315	0.390
74/09/08	09 30		0.320	1.100	0.085	0.170	0.290
74/11/17	10 30		0.860	1.000	0.105	0.300	0.320
75/03/23	10 50		0.178	2.600	0.049	0.249	0.400
75/04/20	11 00		0.075	1.500	0.250	0.330	0.620
75/05/17	12 50		0.080	0.550	0.185	0.290	0.393
75/05/30	15 30		0.970	6.400	0.980	1.000	1.650
75/06/07	16 20		0.570	1.450	0.200	0.540	0.690
75/06/21	14 00		1.100	1.850	0.185	0.510	0.790
75/07/17	15 15		0.750	3.000	0.150	0.280	0.780

STORET RETRIEVAL DATE 76/01/27

3102AA PD3102AA P001116
40 14 30.0 099 38 15.0
OXFORD
31109 7.5 HOLLINGER NE
T/HARLAN CO. RESERVOIR
REPUBLICAN RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/10/07	09 55		0.080	36.000	0.050K	10.000	21.250	0.100	
74/12/20	08 00		0.080	34.000	12.500	12.800	23.000	0.070	
75/01/16	08 30		0.800	27.000	9.000	8.900	14.000	0.024	0.050
75/04/14	13 30		0.050	34.800	16.500	17.000	19.000	0.200	
75/07/29			2.300	4.500	0.180		8.100		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/27

3102EA PD3102EA P000648
40 07 30.0 099 28 10.0
ORLEANS
31 HARLAN CO NE
T/HARLAN CO. RESERVOIR
FLAG CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/11/07	16 00		0.240	11.000	0.071	2.500	3.300	0.009	0.005
74/12/09	10 30		0.080	20.000	0.790	2.100	4.900	0.018	0.013
75/01/08	10 00		0.080	24.500	8.100	2.700	6.800	0.031	0.026
75/02/18	16 00		0.080	33.500	23.200	4.900	10.500	0.031	0.031
75/04/03	14 00		0.080	25.000	2.480	3.680	5.800	0.029	0.017
75/05/14	14 30		0.150	9.800	0.460	2.500	6.000	0.019	0.019
75/07/25	10 00		0.050	25.000	0.082	3.300	4.850	0.003	0.010
75/10/24	14 00		0.025	24.000	1.000	2.900	6.300	0.018	0.015

STORET RETRIEVAL DATE 76/01/27

310221 TF310221 P001280
40 05 30.0 099 21 15.0
ALMA
31083 HARLAN CO NE
D/HARLAN CO. RESERVOIR
HARLAN CO. RESERVOIR
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/10/01	00 00								
CP(T)-			12.000	12.000	1.100	7.700	9.500	0.134	0.137
74/10/02	24 00								
74/11/05	00 00								
CP(T)-			11.000	12.500	0.840	3.800	7.900	0.149	0.139
74/11/05	24 00								
74/12/03	00 00								
CP(T)-			10.100	13.250	1.330	6.900	7.500	0.135	0.137
74/12/03	24 00								
75/01/04	12 00								
CP(T)-			11.600		1.600	6.200		0.145	0.147
75/01/05	12 00								
75/01/07	12 00								
CP(T)-			10.000	14.600	2.300	5.600	7.800	0.135	0.134
75/01/08	12 00								
75/03/04	12 00								
CP(T)-			10.400	16.000	3.400	2.560	8.200	0.187	0.129
75/03/05	12 00								
75/04/01	12 00								
CP(T)-			10.100	16.000	3.700	7.500	8.900	0.166	0.159
75/04/02	12 00								
75/05/06	00 00								
CP(T)-			10.500	16.500	3.500	5.300	8.800	0.135	0.138
75/05/07	24 00								
75/06/03	00 00								
CP(T)-			11.000	9.800	0.530	5.730	7.500	0.152	0.149
75/06/04	24 00								
75/07/01	00 00								
CP(T)-			7.200	13.000	1.150	4.200	7.700	0.185	0.171
75/07/02	24 00								
75/08/05	00 00								
CP(T)-			5.800	13.500	0.140	3.900	6.400	0.198	0.196
75/08/06	24 00								
75/09/02									
CP(T)-			4.100	18.000	4.300	7.100	8.800	0.195	0.194
75/09/03									

STORET RETRIEVAL DATE 76/01/27

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40 05 30.0 099 21 15.0
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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/10/07	00 00								
CP(T)-			5.100	23.000	7.950	4.550	10.000	0.171	0.179
75/10/08	00 00								